

Ocean-Atmosphere Coupling in the Mediterranean Sea

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The inflow of Atlantic water (and outflow of Mediterranean water) through the Strait of Gibraltar and the thermohaline forcing, along with the wind stress curl, and bathymetry can be considered the principal mechanisms driving the general circulation patterns in the Mediterranean Sea. The main objective of this work is to locate and evaluate the coupled ocean-atmosphere modes in the Mediterranean Sea from the statistical analysis of the temporal series of three satellite measured sea-air related simultaneous variables : wind stress curl computed from the surface wind velocities provided by the European Remote Sensing Satellite, sea level anomalies from the merged ERS1-Topex/Poseidon altimetric data and the sea surface temperature from the NOAA/NASA Pathfinder AVHRR Oceans Project. The study examines the ocean-atmosphere coupled patterns in time and space through the use of canonical correlation analysis of the fields. The wide and exhaustive coverage of the oceanic and atmospheric fields from satellites (such as Topex/Poseidon and European Remote Sensing Satellite ERS1) allow a potential detailed inspection of the coupling. By evaluating the coupled patterns between the wind stress and/or sea surface temperature space and sea level, the time-space scales of the coupled modes will be identified for the total 440 day duration of the three satellite datasets in the different Mediterranean sub-basins. The first step of the analysis will focus on the inspection of the frequential components that are present in the satellite datasets. The second step will be the application of canonical correlation techniques to the sea level anomalies, wind stress curl s and sea surface temperatures, which give the covarying patterns (canonical modes) and corresponding time series of two specific fields. The dynamical information which is embedded in those modes will be discussed.